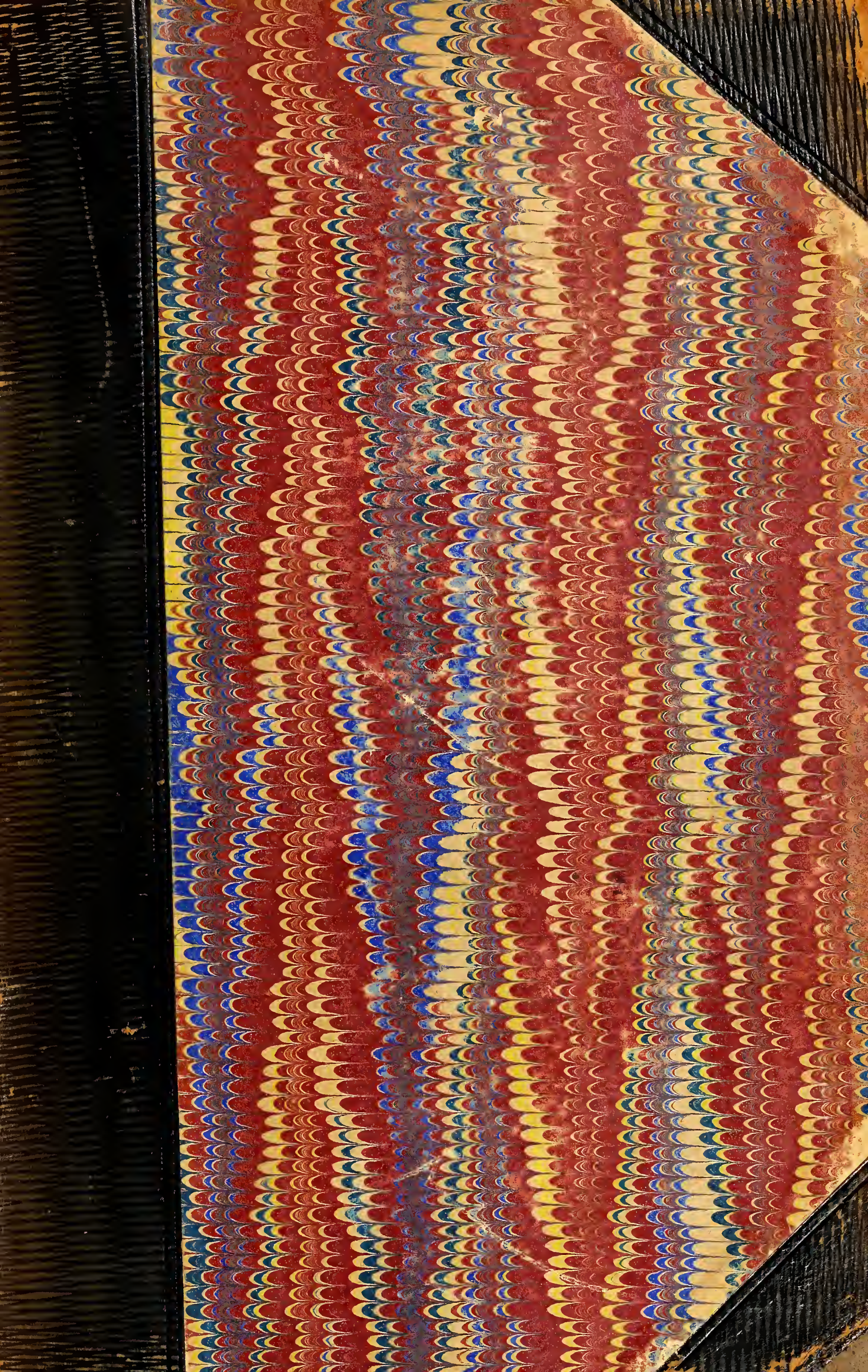

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DEPARTMENT OF AGRICULTURE.
SPECIAL REPORT—No. 62.

OBSERVATIONS
ON THE
SOILS AND PRODUCTS OF FLORIDA.

By WILLIAM SAUNDERS,
SUPERINTENDENT OF GARDENS AND GROUNDS, ETC.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1883.

SOILS AND PRODUCTS OF FLORIDA.

DEPARTMENT OF AGRICULTURE,
Washington, D. C., January 26, 1883.

MR. WILLIAM SAUNDERS,
Superintendent Gardens and Grounds:

SIR: You are hereby directed to proceed to Florida and make investigation as to the capability and probabilities of the fruit-growing and sugar-manufacturing industries of the State, as well as other matters of an agricultural nature. Should you deem it desirable you may stop at other places on your route in Georgia and South Carolina.

Respectfully,

GEO. B. LORING,
Commissioner.

In accordance with the above instructions I left Washington at noon on the 27th of January last, and reached Jacksonville on the evening of the 28th. When I left Washington there was a heavy coating of snow and ice on the streets, and snow was to be seen on the fields until about fifty miles south of Richmond, Va., where it disappeared. Leaving Wilmington, N. C., at eleven o'clock at night, a perceptible change of climate was felt, and the frogs were heard piping in the marshes. After passing Charleston the pools were sprinkled with young leaves of *Nuphar* and *Nymphæ*, and the dwarf palms were in great plenty in low grounds, and in wet places they were massed in close thickets.

Nearing Savannah, catkins were observed on alders and willows, and in cultivated grounds pease seemed to be about six inches in height, and the kale showed thick and green in the rows. The flowers were showing quite bright on the swamp or red maples, and as we neared Jacksonville it became quite warm. We had passed from midwinter weather to midsummer weather in the course of twenty-four hours.

On the morning of the 29th I made several calls in Jacksonville, mainly with the view of learning how best I could reach the Everglades, but did not succeed in gaining any information which could aid me. Peach trees were in blossom here, and the Carolina jasmine filled the air with its fragrance. Not having anything to detain me here, I left about 2 o'clock for Palatka. The afternoon was wet and hazy, and somewhat chilly. The Saint John's River from Jacksonville to Palatka, with its rounding headlands and curving shores, very closely resembles the lower portion of the Potomac River before its entrance to the Chesapeake.

On the morning of the 30th I called on Colonel Hart, of Palatka, who kindly sent me over the river to view his orange grove. This is rated as an old grove; the trees are about thirty years planted, in the oldest part, and appeared to be in good health. Much of the crop had been removed, but many of the trees were still full-cropped. The entire surface seemed to be matted with roots; the trees are so close together that their branches meet overhead. The approved distance is to set the trees 30 feet apart; earlier plantings were from 16 to 20 feet, and some growers have found it advantageous to remove alternate trees in groves where they are too close together. This thinning can be accomplished without sacrificing the trees; it is only a question of mechanics, as orange trees are easier transplanted than any other fruit tree that I know of. Colonel Hart has found it necessary to provide means for irrigating his trees. This is done by laying two-inch iron pipes on the surface, between the rows, through which water from the river is forced by an engine. Thus he is enabled to assist his crop when most in need, which is during the period of swelling of the young fruits. Orange trees require abundance of moisture at that period of their growth, although after the fruit is ripe but little water is required, until growth again commences the following spring.

Much of the fruit is covered with what is called rust. The cause of this is still somewhat a matter of dispute; a prevalent opinion attributes it to a microscopic insect which is found on the diseased fruits; others again, maintain that it is an incipient fungus growth, like the mildew on the gooseberry, and the pear fungus, which causes the cracking of some varieties of that fruit. I observed that in some cases only one side of the tree seemed to be seriously affected, and the fruits in the interior of the tree, where they were well protected, seemed to be entirely exempt. Again, trees were noticed with rusted fruits on all sides, which seemed equally affected. In tracing the origin of maladies of this kind, close observation is necessary to distinguish consequences from causes. It is now well known that the lowest forms of vegetable and animal life, such as fungi and bacteria, may generally be found present in diseased organisms. It is also maintained by many physiologists that the presence of these parasites denotes decomposition, or disease, which may have their origin from other causes, and that therefore they are consequent upon, and not the cause of, disease. Dusting the trees with lime and land plaster, showering the leaves with whale-oil soap and decoctions of tobacco, are remedies said to be found useful; these are well known to be effectual in destroying fungoid growths. There is need for further observation before finally deciding on the origin of this malady. I observed some guava plants, but was told that this point was too far north for the plants to fruit freely. There, as well as at other places in this locality, banana plants were seen. The cold weather in December had destroyed all the outside leaves, but the young ones were pushing up seemingly healthy and vigorous, and as in these plants the fruiting stalks spring up from the center of the stem, and may not be injured to any great degree by the loss of a few of the outside leaves, the fruiting capacity of the plant may therefore not be seriously impaired by the cold. Not having had the opportunity of seeing banana fruits which were ripened in Florida, I am unable to judge as to the effects of this annual partial destruction of the foliage of the plant. Damp, rich bottom lands seem to be preferred for the banana. So far as growth in summer is concerned these places are well fitted; but looking to the probability of the plants being subjected to a check about the end of the year, they would pass this period with less injury if kept dry for some time previous. If ever the culture of this plant becomes systematized into a profitable industry, means will be adopted to control root moisture by means of open ditches which may be flooded with water, or drained dry, according to the will of the cultivator, as he may deem best for the plants.

The orange trees in this grove, as far as I could observe, seemed to be in good health. The treatment and location must be bad, indeed, if a young orange grove shows evidence of weakness in any degree; but here was a grove some thirty years old, the trees set so close that even if each alternate tree was removed they would still be left closer than many of the new groves now being planted, and the trees were in good condition, and produced satisfactory crops of fruit. I do not remember seeing any scale insects on the trees, although, if I am not forgetful, I was told that some trees had been infested, but had been cleared by means of lime and sulphur. With the means now at command of supplying the trees with an abundance of water, the likelihood of their being troubled with scale is reduced to a minimum.

I was shown some young trees, planted on lower and damper soil than that of the main grove, which had not done so well; but a part of the grove had been ditched, with great improvement visible on the trees.

The Tangerine orange was well fruited; also the Mandarin. The origin of these kinds is matter of doubt. The Mandarin was at one time considered to be a species, and was known as *Citrus nobilis*. Later authorities class both this and the Tangerine as varieties of the common orange, *Citrus aurantium*. Again, it is very generally supposed that these two names are merely synonyms, but as grown in Florida they are very distinct varieties. The Tangerine is a more robust growing plant than the Mandarin; it has larger foliage, and the fruit is larger and of a fine deep reddish color. The Mandarin has a weaker growth; the fruit is smaller and of a yellowish color. I think the Tangerine is the more highly valued, as it certainly is one of the most beautiful of oranges, so far as color is concerned.

The grape fruit, of which several well-laden trees were shown, is a very grateful subacid, sprightly, and palatable fruit of the Shaddock family. This is probably identical with the pomeloes, or "forbidden fruit," of the West Indies. There are many varieties of the Shaddock, *Citrus decumana;* the large fruited kinds, weighing ten pounds and upwards, are called pompelmousses, the smaller fruited varieties being known as pomeloes.

Proceeding up the Saint John's River my next stop was made at De Land landing. The river scenery is somewhat monotonous. The cypress is abundant, and the sweet gum plentiful. Occasionally trees of the latter could be seen with still a remnant of last year's foliage so highly colored as to give the appearance of a scarlet blossom.

The palm trees, *Sabal palmetto*, were a never-ending source of delight, being so strongly characteristic of tropical vegetation. De Land is about five miles east from the river. It is a bustling, thriving city, still in its infancy. Judge C. H. Wright, mayor of the city, and one of the pioneers of the place, very kindly took me in charge and drove me round a wide circuit, where numerous planters were industriously setting out orange trees. The lands here are of a gently undulating configuration, well stocked with pine trees suitable for building purposes. The clearings show fields of the usual sandy soil, but the young orange trees do well in it, although it must ultimately be necessary to apply manure in order to maintain a supply of organic matter, of which most of the lands now employed for orange culture are greatly deficient.

Among other places visited was that of Mr. Coddrington, of the Florida Agriculturist, who, from his long residence in the West Indies, is familiar with the culture of tropical plants, many of which he is attempting to cultivate, but the climate admits only of indifferent success with most of them. The *Eucalyptus globulus* was observed near the town, but it seemed to have been injured at some time by cold; a group of several trees had evidently lost their leading shoots, and had assumed the form of spreading trees, having several branches springing from near the surface of the ground. The hardier species of *Eucalyptus* would probably do well as far north as this point, if not further, but *Eucalyptus globulus* is evidently better suited to more southern localities.

Attempts are made here to cultivate pine apples, and they are fairly successful so far as the system practiced will allow. The plants are set thickly together and shaded and sheltered by pine boards as a protection from the cold; but this also excludes light, and the plants are weakened to some extent. It is evident that pineapples can only be grown here by a special system of protective nursing which might render their culture profitable.

The production of vegetables in poor, sandy soils has many drawbacks, but undoubtedly much may be accomplished by the judicious use of fertilizers and choosing the best season for sowing and planting crops. While here, I was introduced to a young man, Mr. Parce, who is making praiseworthy attempts in this line. He has selected a piece of low-lying land and has it well stocked. Cabbages were well advanced, beets, onions, &c., showing well in the rows, and tomato plants nearly coming into flower. Everything seemed to be in need of water, no rain having fallen for several weeks, but Mr. Parce has now provided himself with a windmill and well for water, with which he expects to make himself independent of rain falls. The winter season is here the dry season, and this sandy soil soon shows the want of water, especially when planted to such crops as cabbages and other vegetables with large foliage, and hence irrigation will be a valuable help to production.

A small plantation of strawberries were on the eve of flowering; they were too young, or rather they were too small to produce much fruit. Both soil and climate are against the best growth of the strawberry, and its profitable culture here will probably depend upon a system of management by which the plants will undergo a preliminary preparation either by growing them in pots or in beds of rich soil, so that strong, well-budded plants can be set out in fall for fruiting the following spring. Something will also be gained, in time, by raising seedlings and selecting those which do best in the climate. A variety, said to be from Mississippi, called Noonan, I found to be considered the most valuable at present. On the first day of February I found the thermometer at sunrise to mark 65° in an exposed location, and as the day advanced the heat increased until it became quite warm in the sun.

I left De Land about noon and proceeded up the Saint John's river to Sanford. Going southward, the cypress trees were showing young leaves, and the palmetto trees were seen in great profusion, and in beautiful specimens 30 and 40 feet in height. The extremely winding course of the river is at first novel, then becomes monotonous; the monotony is at once dispelled on reaching Lake Monroe, which (probably because of the great contrast between the irritating scenery on the river), appeared to me as one of the most beautiful of possible lake views. About eight o'clock this evening the thermometer was 76°, but the cool breeze made it more comfortable to sit indoors than out.

Having called on General Sanford, arrangements were made for visiting his and other groves the following day. General Sanford's estate of Belair is a few miles south of the town. On reaching it I was met by Mr. Houston, superintendent at Belair, who accompanied me and imparted much information regarding the experimental tests which have been made in the culture of the citrus family and other semi-tropical plants. There is much of interest, as well as of instruction, to be found in a visit to this plantation. General Sanford has spared no expense to procure from all parts of the world everything in the way of economic plants that gave even the slightest hopes of successful culture in Florida. In this respect his operations have been of much value; even his failures, although they may have been unprofitable to him, have been profitable to the State, inasmuch as they serve to prevent further loss by other experimentors. Among the plants which seemed to flourish were the Jambos apple, *Eugenia jambosa*, which I found in full flower. The star apple of the West Indies, *Chrysophyllum cainito;* several species of *Anona;*

the camphor tree. *Camphora officinarum;* the Mexican pepper plant, *Schinus molle;* the New Zealand flax, *Phormium tenax;* several species of *Cinamomum*, but not the cinnamon of commerce; the arnotta plant, *Bixa orellano;* several species of bamboo; the wampee. *Cookia punctata;* the tropical papaw, *Carica papaya;* the tamarind, *Tamarindus indica;* various Australian plants, such as *Macadamia ternifolia, Grevillea Banksii, Ficus Australis, Eugenia Australis;* several species of palms, among others *Pritchardia pacifica, Corypha Australis, Oreodoxa regia, Seaforthia elegans, Phœnix dactylifera, Phœnix reclinata, Chamærops excelsa, Chamærops humilis*, and *Latania borbonica.*

Camellias, Chinese azaleas, oleanders, Chinese hibiscus, Chinese tea, the loquat, the arrowroot plant, acacias, and many other similar plants endure the open air with little or no injury.

A small plantation of olive trees seemed to be in perfect health; indeed, their very luxuriant growth has probably prevented them from fruiting, which they have not done so far, although they are of good size, and under less favorable conditions for growth would doubtless be bearing fruit. Root pruning would stop excess of growth, and favor fruit production, and the operation might be performed upon these trees with advantage.

The collection of the citrus family in this grove is very extensive. Everything of promising value is procured and tested, and none but those which reach the highest standard of excellence and adaptability are increased. Much expense, time, and attention have been devoted to lemons. The greatest fault which has been found with lemons grown in Florida has been their very thick, coarse skins. Some have supposed that this is occasioned in some degree by climate, and give as a reason that even the finest Sicily lemons, when grown here, lose their delicate thin skins, and acquire a bitter taste. It is much more probable that the fault has been in the variety rather than in the climate, although the latter may exert an influence as suggested. General Sanford has made selections from his numerous varieties, and he now feels confident of producing lemons that will meet the requirements of the American trade in this fruit.

It is probably safe to say that there is no finer collection of lemons in Florida than can be seen in this grove. Oranges have been equally subjected to critical tests. The opportunity is here presented of a comparison of the delicate peculiarities of flavor, sprightliness, and texture of these fruits, of which I found a large variety in bearing. A sweet, pleasant-tasted orange, which one would pronounce as good, is made to appear quite insipid when compared with the rich, brisk, full fruity flavor which is realized in eating a properly ripened fruit of the Jaffa orange. The Majorca is but little, if any, inferior; next in order comes the Maltese oval. after which I would place a variety which was named Mediterranean Sweet. There seem to be several varieties of this name, and they are designated by numbers. The St. Michaels, which is a favorite variety at the Azores, does not stand very high in Florida. It is, however, a fairly good, rather small-sized fruit, and specially productive. The Bahia, as distributed by the Department about ten years ago, is but little known, and the opinion prevails that it is not so productive as other oranges. As to flavor, it takes a high rank. I found that buds of it had been introduced from California, where it is prized above all kinds in that State. There it is known as the Washington Navel, and more lately the name has, in some cases, been changed to that of Riverside Navel. As there seem to be several varieties that receive the name of Bahia, or Navel orange, some confusion may exist. I have seen a very inferior fruit which was sent out as the Bahia. Those imported by the Department from Bahia were distributed both in California and Florida, and while it is claimed as the best variety grown in California, it has not proved of sufficient merit to attract any attention in Florida. I think that it is doubtful whether any of the trees of this variety which were sent to Florida by the Department have yet fruited. There have been several importations, in former years, of orange plants from Bahia into Florida, and these may be different from those imported and distributed by the Department.

Pineapples are cultivated to greater perfection here than I have seen them elsewhere in Florida. An extensive assortment has been collected from all parts of the world where pineapple plants were to be found, so that the opportunity is presented of selecting those varieties which prove best adapted to the climate and conditions of culture here. The only drawback seems to be the likelihood of a check to growth and maturity of the fruit from cold nights in early winter. To guard the plants from extreme injury they are protected by a covering of palmetto leaves, which answer admirably, and much better than the almost absolute shade which results from a covering of boards. A slight shade even in summer is found to be of advantage to the plants under this artificial treatment. The covering consists of a horizontal trellis supported by posts elevated a foot or so above the top of the plants, and thatched with the large leaves of the palmetto. On looking under this cover the plants were seen to be in good healthy condition, and many of them bearing large, nearly ripe fruits. The ripe apples are gathered once or twice a week, and several dozens of fine fruit were shown me in the fruit house. Some of the kinds bear as large and as handsome fruit as I have seen. One turned the scales at ten pounds. This was a splendid specimen not often excelled under any system of culture. At various points I observed that pineapples which had received no protection whatever were slightly injured by cold, but the points of the leaves only seemed to be hurt, and the center of the plant not damaged. These were mostly young plants laid closely together in trenches to be ready for planting out in spring. Where no protection is needed the pineapple is grown similar to cabbages; they are set out in rows which are 3 or 4 feet apart, and the plants about 3 feet from each other in the row; but where protection is necessary they are set more closely together in beds for convenience in covering. The general routine of pineapple culture in Florida, as I saw it, is to set out the rootless cuttings or side shoots in early spring. These soon form roots and start into growth, and by the end of summer the plants are large enough to fruit. But before the fruit becomes ripe cold nights set in, and a covering becomes necessary at a time when all the sunlight possible is required to mature and flavor the fruit.

To provide for this contingency the plants have to be set in closely packed beds so that the covering may be applied, and withal the fruits cannot reach the perfection they would attain if they could be fully exposed to the weather without risk of injury from cold. It would be better in every respect to change this protecting period to the young plants; for instance, if a suitable spot could be selected, the soil made rich (which could readily be done on the limited area required), and the offsets planted at suitable distances apart, and encouraged to grow during fall and winter, they would then be well rooted plants when set out permanently in spring, and probably yield ripe fruit in fall before protection became necessary. But the more certain method would be that of growing the young plants in glass covered frames, and in pots, or cheap chip baskets, anything to partly or wholly confine the roots, so that no check to growth would be experienced when the plants were removed. By this means fine plants could be obtained; the object to be secured is that of having plants for permanent planting so far advanced that they would fruit early in the fall of the same year they were set out. This might require more labor and attention than is needed by the present system, although I incline to think that it would not. But in industries of this kind the mere amount of labor required is not a point of much moment, the vital question is in making the labor profitable; and the more labor which can be profitably employed, the more will profit be increased.

Although the pineapple succeeds tolerably well in sandy soils, yet the best plants and finest fruits are produced in soils of a loamy character. There are plenty of lands in Florida where the pineapple can be grown to great perfection. Such are the lower lying richer lands usually selected for the culture of culinary vegetables. It may be suggested that the best preparation of this kind of soil for this fruit, after necessary drainage, is to plow it up in narrow ridges, leaving deep furrows between them; the tops of these ridges would be between 3 and 4 feet apart, the plants to be set on the top of the ridge. This would secure both depth and warmth of soil. The pineapple is not averse to moisture when the soil is warm and the plant in growing condition, although it will *exist* under conditions of considerable dryness. The best fruits which I have seen, both as to size and quality, have been taken from plants which were grown on a strong loamy soil. Another expedient might be tried. In certain parts of the world where the seasons are irregular and late spring frosts of common occurrence, it is a practice to collect piles of dried weeds and other combustible rubbish, to be ready for firing and raising a smoke in orchards of apples and other kinds of fruits which would be liable to sustain injury from a slight frost. This is becoming a common practice in California, in sections where frosts prevail after the vineyards are well-advanced in growth. Pacific papers make frequent mention of crops having been saved through this means, while neighboring fields, where this precaution was not employed, have suffered severely, and I can vouch for its efficacy in my own practice. Frosty nights are so rare in this part of Florida that this precaution would probably be sufficient to prevent injury, not only to plantations of pineapples, but also to orange groves. The fires may be lighted at night when frost is indicated, but it is found equally a preventive of injury if the smoke is thrown densely over the plants before sunrise. A sprinkling of coal tar, on dampened straw or weeds, increases the density of the smoke and renders it more effective.

Through the kindness of the Rev. Lyman Phelps, of this place, I was enabled to visit several orange groves in the immediate neighborhood. Mr. Phelps is noted for his knowledge of orange culture, and his great enthusiasm in everything pertaining to it. In passing from one grove to another the effects produced by judicious culture were very striking. Where the ground had not been surface stirred for some time, and grasses and weeds allowed to grow, the effect could be observed in the yellowish-green appearance of the foliage; sometimes this was so marked as to be seen for a considerable distance from the trees. Wherever scale insects were seen on trees it was on those whose vitality had become weakened, either on account of the poverty of the soil, or through neglect in cultivation, or both combined. I have to state, however, that I saw but little of the scale insect anywhere, and I presume that it will be found more frequently near the northern limits of orange culture than in more southern localities, where the growths are better matured before the autumn colds occur. On the first appearance of the scale insect on orange trees in Florida, fears were entertained that it would be difficult to eradicate, as no very effectual method had been found for its destruction. About twelve years ago the Department of Agriculture secured a large collection of citrus trees from Europe. When they arrived it was seen that they were badly infested with the scale insect, and it was not considered advisable to increase the plants until they were perfectly clean; efforts were made to clear them of the last vestige of the insects, but this proved to be no easy task. After years of fruitless efforts, during which time many remedies were tried, none were found to be effectual except coal oil; this, showered over the trees, had the effect of dislodging the scale, and ultimately the plants were cleaned. One-half pint of the oil was poured in six gallons of water, this was applied with a hand syringe, the water and oil being agitated while the application was being made. On being informed of the success of this remedy, it was tried in orange groves, also with success; but the method of application was crude, unsystematic, and indefinite, owing to the impracticability of mixing the oil and the water: this has now been overcome by making an emulsion of the oil with milk, which afterwards can be diluted with water.

Mr. Phelps has a good collection of oranges in his grove, and some time was spent in testing their respective qualities. The most conspicuous variety was a healthy, vigorous Tangerine tree, bearing fruits of a brilliant scarlet color; seen from a distance, it appeared as if sprinkled with the blossoms of a scarlet geranium. This grove receives thorough culture, and Mr. Phelps uses fertilizers very freely, and with evident advantage. The soil is poor, and it seemed to me, requires to be re-enforced with a supply of organic matter. I was constantly impressed with the suggestion that, in selecting the highest lands for planting, and which are usually the poorest, the more fertile bottom or lower lands were overlooked: these, after being properly drained, would be better adapted for a permanent healthy grove than the poorer sands on the plateaus. Of course it would not be wise to plant in places where good drainage cannot be obtained, but there are plenty of good lands well supplied with organic matter which could be laid dry at trifling expense.

The cost of tile draining was given as one reason for the rejection of these wet grounds, but in this climate open ditches can be retained at little cost, since there are no frosts to crumble down the banks, as in more northern regions where sloping banks are ultimately brought down to the "angle of repose" by the action of frosts and rains. A portion of the grove on this place has been planted in lands thus ditched: the section of the ditch showed a considerable amount of black deposit mixed with the sand, and the trees appeared in most perfect health, and bearing abundantly of fine fruits.

The cow pea is very generally employed as a green crop for the improvement of these sandy lands. This is plowed under both before and after planting the trees. After the trees have made several growths, and the roots have extended for a considerable distance, the deep plowing necessary to properly cover the pea vines is considered to be injurious, which it undoubtedly is; but it has been related by many planters in Georgia and other States where the cow pea is largely used for the amelioration of poor lands, that they have found as good results where the vines are allowed to decay on the surface, so that by this means orange groves may be fertilized without plowing or disturbing the roots of the trees further than what may be necessary in planting and covering the seed.

Having spent as much time here as I thought advisable, I turned my attention towards finding the best means of reaching the region of the Everglades, where the improvements connected with the drainage of these lands were being prosecuted. With this object in view I called on Mr. Ingraham, the president of the South Florida Railroad. On learning that I wished to see the nature of the country, and the soil of the lands surrounding the lakes in the region of the Kissimmee River, he promptly suggested that I should take advantage of the opportunity of accompanying the president and directors of the Florida Land Improvement Company, who were then at Kissimmee City making preparations for a voyage from that place to Okeechobee, and from there to the Gulf of Mexico.

Mr. Ingraham at once communicated with Mr. Disston, the president of the company, and these negotiations resulted in a dispatch from that gentleman inviting me to accompany him in the trip through the Everglades. Thus, through the kindness of these gentlemen, I was put in the way of seeing more of that region than I otherwise could possibly have done, all of which I duly appreciated. Mr. Ingraham having further extended his kindness by arranging for my reaching Kissimmee City, and learning that Mr. Disston would not leave that point for a day or two, I accepted the invitation of Mr. Chase, of Winter Park, to visit that place and its surroundings.

Winter Park is finely located; it is bordered by a series of lakes; the ground slopes gradually from the higher pine lands to the margin of the water. This is a new place, only quite recently a pine forest, through which avenues and streets are now being formed, and clearings made for building-sites and orange groves. There are numerous orange groves in this vicinity, and preparations for their extension were everywhere visible. The guava flourishes well here, although the plants seemed to have suffered slightly from cold. A plantation of several acres was seen. The fruit is utilized by being made into a jelly, a sample of which was presented to me. The guava is too perishable a fruit to be sent to market in a fresh state, but the manufactured article may result in a profitable industry. As a fruit for domestic consumption in its ripe state, the guava is very justly held in high estimation by most families, and I can testify as to its value as a dessert dish when properly prepared for the table. The species of guava mostly grown in Florida appear to be the pear-shaped variety of *Psidium guaiava*. The purple guava, *Psidium cattleyanum*, is considered to be a more palatable eating fruit, and has a juicy flesh of a very agreeable acid-sweet flavor.

This Brazilian species is rather more tender than the species previously mentioned; the plant is also very distinct in appearance, assumes a more tree-like form, and has foliage somewhat resembling a camelia. I observed some specimens at Belair, but they did not seem to be entirely adapted to the climate.

Among other groves visited in this neighborhood was that of Judge Lawrence. This grove is quite young, but is very promising. I allude to this particularly because of a system of treatment which I had occasion frequently to recommend before coming here, and that is to sow the young orange groves with oats or rye in the fall and cover it over in spring, or cut it up for surface mulching during summer. Mr. Lawrence sows oats in the fall over the surface of his young groves, seeding very thinly; then by running over the field with a cultivator in early spring, the oat plants are loosened up and then raked together and spread over the roots of the orange trees and there allowed to decay.

As I will not have much more to say about orange culture in these notes, I may here remark that the climate of Florida seems particularly well adapted to the orange. Being somewhat familiar with the culture of the orange in glass structures, not merely as ornamental plants, but for the production of fruit for table use, just as grapes are grown under glass for a like purpose, the climatic conditions which have been found necessary for success under artificial treatment are similar to those afforded naturally in most parts of Florida. Under artificial culture the best results attend a course of periodic treatment somewhat as follows: About the time that the trees have nearly finished flowering, and have just commenced to make fresh leaves, copious supplies of water are given to the roots, and the atmosphere is kept supplied with moisture, with an average temperature of 65° to 75°, or ten degrees lower during night than the lowest sum stated, if the weather is very cold. This temperature is maintained for two or three months, with ample ventilation and a drier condition of atmosphere as the fruits approach their full size. Water at the roots is supplied as required. When indications of coloring appear on the fruit the atmospheric moisture is still further reduced as well as the water at the roots, and when the fruit has ripened, moisture both in the air and soil is avoided as far as possible. During the months of December and January the soil is kept as dry as practicable without actual injury to the vitality of the plant; the atmospheric temperature is also kept about 45°, or but little over the freezing point, for a day or two at a time, when the weather is extremely cold. It is found better to thus lower the temperature than to subject the trees, at this time of the year, to great artificial heat.

Trees thus managed will stand considerable cold without injury. I have known a large house full of orange trees to be subjected to ten degrees of frost without hurting the plants; but they were at the time in the best condition of repose to withstand it. This dryness of soil and lowering of temperature during late fall and winter tends to harden and ripen the growths, and favors the maturity of the flower buds. From what I saw and learned relative to the climate of Florida, its periodic conditions of rainfall and heat coincide, in a marked degree, with the routine of treatment which I have sketched above. The climate is better fitted for orange growth than is the average of the lands; this is also a favorable condition of things, because it is easier to improve and change the character of the soil than to make a change of climate. But, looking at the quality of the orange as grown in Florida, it seems scarcely possible to improve it, yet it may be related that fruits produced on strong loamy soils and on clayey soils have more saccharine matter than those which have grown on sandy soil.

The relative merits of budded orange trees and seedlings is a matter very frequently discussed in orange-growing communities. So far as I understand the question, it resolves itself mostly into the respective longevity of the trees; considered purely in that light it can only, I take it, be a matter of conjecture, which can be settled in the coming centuries, if it is ever settled. The same question has often been discussed with regard to the apple, pear, peach, &c., and is still unsettled. It is often argued that peach trees raised from seeds planted in the orchard and never removed or budded are longer lived than the ordinary nursery trees which have been budded and transplanted. The oldest bearing peach tree which I have seen was grafted on a plum stock; it was sixty years old, and looked as if it might live for sixty years more. The age which budded trees may attain need not be a matter of present anxiety. The more important question is that of the commercial value of the products of budded and seedling trees, a question, it seems to me, not difficult to determine.

It is safe to assume that the time is not far distant when oranges, like other commodities, will be bought and sold under properly designated names or brands. An apple or pear orchard composed of seedling trees would not be considered of much value. Some varieties of the peach are very closely reproduced from seed, but peach growers are not willing to run the risk of possessing a mixture. They wish to grow certain well-defined varieties, and accordingly they plant trees budded with these varieties. The varieties of the orange have the reputation of reproducing themselves from seed more closely than any others of our cultivated fruits, but there is no absolute certainty that they will all be precisely of the same size, appearance, or quality, and this difference will, just in proportion to its extent, diminish the marketable value of the crop. It may therefore be considered a wise proceeding in those who are setting out orange groves, if they are planting none but trees budded, or to be budded, with well known meritorious varieties.

Inquiries as to the best stock for dwarfing the orange have been met by suggesting that seeds of the mandarin be planted and the young plants used as stocks for dwarfing the large fruited varieties. It has been stated that the small growing Otaheite orange makes a good stock for this purpose. The northern fruit trees, such as apples and pears, do not succeed well in middle and southern Florida. Lately the Le Conte pear, a descendant of the Chinese sand pear, has been much planted. Several of these trees which I observed in this neighborhood did not promise much in the way of fruit; the warm climate keeps them constantly in a growing condition, which prevents that thorough ripening of the wood necessary to the formation of fruiting buds. As the trees attain age they may improve in this respect, but trees of this variety, of the same age, in the grounds of this Department, are well covered with flowers at the present time; indeed they produced some fruits last season. In the northern parts of Florida, and States adjoining, the Le Conte pear is considered one of the best fruits which has so far been introduced; its southern, as well as its northern limits of successful culture, will be defined by experiment.

The Japan persimmon seems to find congenial climatic conditions in Florida; there are many varieties of this species, and of various merits. I learned that quite extensive plantations were being made, so that in a few years we may expect to see the fruit in our markets, where it will certainly command respect for its size and appearance, if not for its good qualities.

February 5.—On my way to Orlando this morning, I stopped to look at a factory where glucose is manufactured from cassava roots. The proprietor of the establishment being absent I could not procure any information regarding the yield of roots, or the amount of starch they yield per acre.

To reach Kissimmee City in time to avail myself of the opportunity of accompanying Mr. Disston, I was obliged to leave Orlando about noon. In the brief hour of my visit at this place I learned enough to convince me that it would be to my advantage to spend one or two days in this locality, and on leaving I promised to return and accept at least a portion of the many offers which were extended me to visit various interesting points in that flourishing neighborhood. I regret, because of the promise made, that circumstances prevented me from fulfilling it.

After reaching Kissimmee City I found that the expedition would not start until the following morning. This embryo city is situated near the northwest shore of Lake Tohopekaliga. This lake covers a surface of about 26 square miles and is 65 feet above tide water. The immediate surrounding country is of a level character, but rising sufficiently above the lake to admit of draining into it. The soil is mostly dark colored, a mixture of decayed and decaying vegetable matter and sand. Making a vertical cut on the bank of the lake, I found an average of 18 inches of this deposit, underlaid with a yellowish sand. This soil is well fitted to produce any of the crops usually planted in Florida, if drained, and would be easily adapted to the growth of sugar-cane by running open ditches through the fields to take off surplus water. Even this precaution may not be essential, as the water level of the lake is being lowered from the dredging operations now in progress.

For pineapple culture these lands appear to me to be better adapted than any that I have yet seen in the State; and that a test was about being made was evident from the fact that a stock of twenty thousand young plants were lying in trenches ready for transplanting as soon as the ground could be prepared for them. Cabbages, lettuces, and other vegetables of good size and appearance were seen in house gardens, but as the place is newly commenced there has been no time for improvements.

In the course of conversation with a resident, I found that he had the opinion that all kinds of tropical plants could be cultivated here to perfection. I have heard this statement so often made with regard to the Florida climate, and so persistently maintained, that I have been particularly observant on this point, and am fully convinced that very erroneous impressions prevail on this subject. The summer climate of Florida is tropical; indeed, we find this tropical summer region to extend to other States. The length of the tropical season diminishes as we proceed northward. But the knowledge of the native country of a plant is not alone sufficient information to enable us to designate its power of endurance of cold. The mere fact that a plant is a native of China, or that it comes from South America, will not in itself enable us to assign a limit to its climatic range, as we have plants from these countries which are capable of resisting a zero cold, while other plants from these countries would be completely destroyed if subjected to a temperature of 32° F. Temperature is the regulating factor, and as this is affected by elevation as well as by increase of latitude, we find the mountain ranges near the equator presenting all the features of a tropical, a temperate, and even an arctic vegetation. Thus palms, plantains, chocolate, and coffee luxuriate at the bases of these tropical mountains. Above these appear oranges, lemons, and limes; then succeed corn and wheat; and still higher commences the series of plants peculiar to temperate regions. Similar phenomena present themselves in temperate latitudes. Says a geographical writer:

> We may begin the ascent of the Alps in the midst of warm vineyards and pass through a succession of oaks, sweet chestnuts, and beeches till we gain the elevation of the more hardy pines and stunted birches, and tread on pastures fringed by borders of perpetual snow. At the elevation of 1,930 feet the vine disappears; at 1,000 feet higher the sweet chestnut ceases to thrive; 1,000 feet farther up and the oak is unable to maintain itself; at an elevation of 4,680 feet the birch ceases to grow; and the spruce fir at the height of 5,900 feet, beyond which no tree appears. The spreading, rusty-leaved rhododendron then covers immense tracts to the height of 7,800 feet, and the herbaceous willow creeps 200 to 300 feet higher, accompanied by a few saxifrages, gentians, and grasses, while lichens and mosses struggle up to the imperishable barrier of eternal snow.

De Candolle calculated that in France every 540 feet of vertical elevation are equivalent to a receding of one degree from the equator, while Humboldt estimated that in tropical countries every rise of 396 feet is equal to one degree of latitude north. I also heard a great deal said about acclimatizing plants. "Undoubtedly," said an enthusiastic grower, "we can, right here in Orange County, acclimate the mango, coffee, chocolate, pepper, vanilla, nutmeg, cinnamon, tea, licorice, and indigo." Thus grouping together plants of widely varied hardihood is often encountered; for instance, the three last mentioned plants are sufficiently hardy to be grown over a large portion of the United States, yet they are classed with plants strictly tropical in character.

The acclimatization of plants, although a subject frequently alluded to, has no tangible support or foundation on facts. A species of plant is either fitted or unfitted, either hardy or tender, in any given climate or locality. It is a question to be decided by trial. If a species of plant proves to be tender in any country there is no known method by which its constitutional hardiness can be increased. If the coffee plant, *Coffea arabica*, is too tender to stand the climate of Orange County, Florida, there is no known process by which it can be made to do so· Acclimatization in this respect is a myth. About noon on the 6th of February I went aboard the steamboat, on Lake Tohopekaliga, which at once proceeded to the lower end of the lake, where the work of canal dredging is now in operation. After two hours' sailing the mouth of the canal was reached; here the boat was turned round and allowed to drift, stern foremost, into the canal. Floating with the current, the dredge-boat was reached in about one hour, being a little over three and a half miles from the mouth of the canal. The operation of the dredging machine is very interesting to a stranger. This ponderous affair creeps through the swamp at the rate of twelve feet an hour, leaving in its trail a canal about thirty feet wide and six feet deep. Still more interesting is the result to be achieved by the comprehensive system of canal cutting, and draining lands, of which this is but a commencement. This system involves the drainage of many millions of acres of the richest lands in Florida, acres which at present are of no value whatever, or of so little as not to be worthy of consideration among the enumerated products of the country. The vertical face of the cutting shows a stratum of decayed and partially decayed vegetable matter varying from eighteen inches to several feet in thickness; this is underlaid, for the most part, with sand. Portions of the cutting run into a hard, somewhat tenacious, clay-like substance, which crumbles when exposed to the weather. The dredge deposits the excavated material on the bank, where it soon becomes covered with a growth of the surrounding vegetation. A part of the cutting which was thrown out shortly after operations commenced last July was leveled and sown with jute seeds, and in a few weeks the jute plants were six feet high, when the cattle which roam at liberty over the country found that the jute plants were palatable and speedily devoured them; the stumps which the cattle left indicated a robust growth. This shows that the soil only requires draining to be immediately available for crops. It also furnished evidence of the lowering of the water, a fact conceded by the cattle owners, who stated that they had rarely, and only in specially dry seasons, seen cattle in that particular spot, but which they could now approach on dry land. Since the commencement of the work last summer Lake Tohopekaliga had been lowered 38 inches.

This canal will connect the last-mentioned lake with a smaller one called Lake Cypress, which covers about 12 square miles. The winding river which connects these lakes is about 15 miles in length; the connecting canal is about 4 miles long. When I started for this point, my intention was to return to Kissimmee City by the steamer; but being urged to embrace the rare opportunity of seeing more of the country, I accepted the further hospitalities offered. On reaching the lower end of the canal we met a boat which had just arrived from Lake Walk-in-the-Water with a party of tourists who were thus far on their route to Kissimmee City. Mr. Disston then made the following arrangement for me: The tourists to be taken to Kissimmee City by the steamer. The boat from Walk-in-the-Water to proceed to Tiger Lake and remain there until our arrival. The officer of the steamer to telegraph from Kissimmee to Fort Meade ordering a conveyance to meet me at Lake Walk-in-the-Water and carry me from thence to Fort Meade; in the mean time I was to accompany the party as far as Kissimmee lake. In looking over the dredge-boat I observed that a part was fitted up for sleeping accommodations for the workmen. Thinking that these would be rather unhealthy lodgings, I asked the superintendent about the health of the employés, and he stated that since the first commencement of the work of building the dredge, more than twelve months previous, an average number of twelve men have been employed and not one of them has lost a day's work from sickness, and most of them had been employed from the first. He also said that they found no inconvenience from heat, as most of the time a cooling breeze prevailed, and the nights were exceedingly pleasant and agreeable. This is owing to the proximity of the ocean, and the narrowness of the peninsula. The Gulf of Mexico on the west and the Atlantic ocean on the east furnish cool breezes almost constantly. I found this to be the case during my stay; in the sun it would be very warm, but in the shade it was agreeable, and I was told that the climate is very uniform in this respect.

Early on the morning of the 7th a movement was commenced towards transferring the party to a smaller steamboat which was lying in the Kissimmee River about half a mile from the canal. It will be readily understood that as the dredge-boat advances the water from the lake follows it, and as the boat is now nearly four feet lower than where it started to cut, the overflow is sufficient to cover the surface two feet or more in front of the boat, extending laterally to a considerable distance before it finds its way to the lake below. This flooding provided plenty of water to float a small boat between the canal and the river. In a short time the transfer was made and the boat was steaming down the river towards Lake Cypress.,

Cypress Lake is about 60½ feet above tide water. Emerging from the lake the river is again entered and followed until reaching Lake Hatchnaha. Any attempt to describe the crookedness of these rivers would, I fear, do them great injustice. It is difficult to distinguish any margin to these rivers. The fall is so slight that the water appears to spread over the adjoining lands through the lower sinuosities, not entirely covering the surface by any means, as the many dry hillocks and banks covered with low-growing willows and other vegetation sufficiently prove. Rabbits also abound. These animals appeared to me to be rather out of place in these swamps, but they make their homes there, and probably furnish an occasional choice dinner for the wily alligator. To show the food value of these waters, a hook with line attached was dropped overboard and dragged astern of the boat. In a few moments a fish was drawn up which weighed over 10 pounds. This was repeated several times with a like result, showing that it was a merely mechanical operation to fill the boat with fish. These fish, I was told, are a species of bass, and, as I can testify, are a good article of diet.

Lake Hatchnaha is 60 feet above tide-water, and covers about 15 square miles. Passing through this lake we again come to the river, which is followed until Lake Kissimmee is reached. From Lake Cypress to this point, following river and lake, is about 19 miles. A canal between 3 and 4 miles in length will, in a short time, form the connection between these two lakes, and take the place of the present meandering water way.

Before coming here I was under the impression that this whole region of country was one continuous swamp as far as the eye could reach. But this is very far from being the case. We have not, so far, appeared to be more than a few miles from vast pine forests, and with a field-glass could readily distinguish herds of cattle quietly grazing among the trees. At a point not far from the entrance to Kissimmee Lake the lands showed considerable elevation, and for some distance the river passed between banks probably six or more feet in height. These lands are undoubtedly well adapted for fruit culture; what I could see of the soil showed that it was fertile. I was informed that General Sanford had selected lands near this locality, of which he proposed to plant 1,000 acres in lemons. Kissimmee Lake covers over 40 square miles and is 59 feet above tide-water. After entering this lake the boat was headed towards the eastern shore, and after an hour's sailing a landing was made on the property of Mr. Shiver, an old settler in these parts, who gave me much useful information concerning the resources and capabilities of the country. Mr. Shiver's business is mainly that of raising cattle. He does not cultivate many crops, and these only for family use. He has a small plantation of sugar-cane, which supplies him with sugar and molasses. I saw in his warehouse several barrels of sugar, a sample of which I brought with me. On his bottom land the cane grows to a length of 15 or 20 feet and very stout; it does not require resetting oftener than once in eight or ten years. There were several thousands of acres of land lying between the shores of the lake and the pine forest of the same quality as that where this cane was growing. The pine lands were between 2 and 3 miles distant from the lake at this point. These pines furnish material for house building. Mr. Shiver had recently erected a dwelling-house, and it occurred to me that our northern architects might glean useful hints from the dwellings here. Northern houses are constructed for winter protection rather than for summer comfort, and it seems possible that they might be made with a greater degree of adaptability to the exigencies of climates where cold winters are succeeded by tropical summers.

In reply to inquiries relative to the healthiness of the people, insect annoyances, and so forth, Mr. Shiver said, "We are healthy enough; mosquitoes are sometimes troublesome, but as a general thing the evening breeze blows them away. Fleas are occasionally troublesome, especially if hogs are allowed to come near the house; we have no trouble from snakes."

After leaving Mr. Shiver the boat was headed westward, and reached the shore shortly after dusk. An encampment was made under the spreading branches of a huge live oak; a fire was soon started which lighted up the wealth of moss which draped and festooned the surrounding trees.

With regard to the production of sugar, it is beyond doubt that these lands, after being drained, are especially well fitted for the growth of the tropical sugar-cane. As far as I have seen—and there is every reason to presume that all of the lands to be influenced by the drainage system are of a similar character—the surface soil is composed of decomposed vegetable matter; this varies from one foot to many feet in depth, and, so far as organic matter is concerned, it is apparently inexhaustible. Drainage is only the first step in the work of reclaiming these lands. There are large tracts where the vegetation has been kept down by cattle which may be rendered arable by ordinary plowing, but the greater portion will be most economically brought into condition by the use of steam as a motive power. Heavy plows could then be used to turn over the tussocks, canes, and rough vegetation, which, after being dried in the sun, could be gathered into rude piles, burned, and the ashes spread over the land.

The climate here is equally favorable to that of Cuba for working up the cane. Frosts are almost unknown, and when they do come are so slight as not to injure the cane, so that the work of manufacture can go on throughout the winter, or, for that matter, throughout the year at any time when desired. Cane is pressed at all seasons in this part of Florida; if it is not convenient to grind it in October, it may be kept uncut until June. Again, the cane will ratoon for ten years or more before replanting is essential. In Louisiana from 25 to 30 per cent. of the best cane has to be used for replanting. These are important factors when applied to an industry of this kind.

Another favorable feature is the great stretches of pine forests which abound in proximity to the lower lands. These will afford the best positions for settlements—high, dry, and as healthy as pine forests can make lands of this character. The material for building, and for what little may be needed for fuel, will also be yielded by these woodlands. Other crops can also be cultivated, such as corn, hay, and most all kinds of culinary vegetables. All varieties and species of melons can be produced in great perfection; rice, as a matter of course, will flourish well.

Nowhere have I seen, what appears to me, more favorable conditions for tea culture, or lands better adapted, than can be selected here. The tea plant, although hardy enough to stand the climate of Washington, gives an inferior product wherever it is subjected to frost. The rainfall in Florida is also more favorable for leaf production; enough of the plant may be grown, at least, for domestic use, even if it cannot be produced profitably as a commercial commodity, which lessens in probability as the prices of teas fall.

February 8.—Our peaceful slumbers were interrupted at an early hour this morning. Camp beds and tents were shipped, and the boat started before daybreak. Shortly afterwards we entered Tiger Creek and followed its intricate windings for two hours, when we reached Tiger Lake. At many points on this creek the dry meadows and pine trees were seen close at hand. The margin of the river is studded with masses of willows and ashes, and in many places these were densely covered with the night-blooming *Ipomœa bono nox*, which had been in a blaze of beauty during the night, as could be seen from the thousands of closed and closing flowers which we passed, many of which we gathered from the overhanging branches as the boat brushed through them. These thickets of low trees seem to be selected by many kinds of birds as their resting places for the night, who fled as the boat approached them, the tardy ones being hastened by the whiz of a rifle ball, its only effect.

After crossing the end of Tiger Lake, a halt was made at the mouth of Roney's Creek, where we found the boat which was to convey me farther, as previously arranged. On leaving Mr. Disston and the other gentlemen of his party, I endeavored to express, as best I could, my keen appreciation of the many kindnesses they had shown me, and their great desire, which was constantly evinced, to assist me in every way within their power. To Col. Jas. M. Kreamer, chief engineer of the Florida Land Improvement Company, who is perfectly familiar with all parts of this country, I am indebted for a large amount of useful information connected with these lands. Also I would mention that Captain Rose, the superintendent in charge of dredging, and master-mechanic of the company, rendered me great service in my investigations, even at the expense of his own personal comfort and convenience.

Our course now lay up Roney's Creek. As further progress depended mainly on manual power, I found that in the distribution of labor I was delegated to act as helmsman, while my two shipmates, so to speak, were to furnish the motive power with poles, one on each side. Our movements were continuous, although our progress was slow, but in due time we reached Lake Rosalie, which seemed to be nearly circular, 5 or 6 miles in diameter, and as beautiful as its name. After sailing a short distance round the margin of the lake we again entered the river which connected with the lake we were aiming to reach.

So far as relates to crookedness, this river could not easily be excelled. The current was stronger, owing to the 8-foot fall in the 10 or 12 miles, as the river goes, between the two lakes. The surroundings were also different; we were now sailing through a tolerably dense growth of trees; in some spots the branches met overhead, forming a welcome screen from the hot sun, which, taken in connection with the necessity of turning the boat to a right angle every few minutes, made my position uncomfortably perplexing. At certain points our progress was arrested by sunken logs. These impediments were overcome by the men leaping into the water, and lifting the boat over the obstruction. The effect of these baths seemed to be invigorating, and were hailed with pleasure, but my position of duty denied me this luxury. These occasional *soundings* showed that the water had an average depth of about 3 feet.

The trees seemed to be composed mainly of ashes and maples, mostly thickly studded with *Tillandsias* and ferns; the undergrowth is very dense; occasionally a large beautiful fern could be seen on the banks. I could only afford a stray glance at the side vegetation; my attention was mostly directed to the bank which seemed to be constantly about six yards distant and right in front of the boat.

As the sun was declining behind the trees we entered into Lake We-olw-ya-kapka, commonly called "Walk-in-the-water." A favorable breeze was blowing; the mast was elevated and sails spread; the four or five miles were speedily passed over, and at dusk we stepped ashore at the young city of Hamburg, in Polk County. My first inquiry was about the conveyance which I expected to find waiting at this point, but it had not arrived; I could do nothing but wait patiently. This is a very new settlement with a resident population of three persons. The evening was spent around a camp-fire, and sleeping accommodations were provided under a thatch of palmetto leaves. The fatigue of the day made sleeping an easy matter. When I awoke next morning the sun was shining, birds warbling, and alligators sporting in the lake; a saucy-looking chameleon was perched on my valise, and paid but little attention to my movements, gliding up the posts of the rude structure, disappearing under the palmetto leaves, and momentarily appearing at some unexpected spot—a soft-eyed, gentle, and friendly looking creature, the very essence of animal activity. In the woods the *Vitis vulpina*, and what appeared to be a form of *Vitis labrusca*, were frequent; blackberries in full flower. The grapes had made about 2 feet of young growth, so that their resting period must be of short duration. Along the margin of the lake, among tall palmetto trees and thick undergrowth, the warmth was oppressive; at some places the bank was abrupt, but it was generally sloping for 200 yards from the water, the higher points probably 30 or more feet above the level of the lake.

The monotony of the day was relieved by the arrival of two boatmen whom I had seen for some time crossing the lake. They proved to be alligator hunters, and I learned from them that they had killed sixty-five alligators within a week. They kill them for their skins, which are an article of commerce. The largest they find is about 12 feet in length, and but few of them; the average length is 8 feet.

Towards evening the anxiously looked for conveyance arrived, and preparations were made for an early start in the morning. From this point to Fort Meade the distance is about 25 miles. The road lies mostly through pine forests; the surface of the country is of a gently undulating character, varied by long stretches of nearly level, wettish lands, with a black surface-soil of no great depth. Occasionally acres of the dwarf palmetto had to be passed through, their creeping stems crossing the pathway in every direction, making the most disagreeable traveling which it is possible to conceive. This is the worst plant to encounter in clearing Florida lands. The white and blue *Violas* were in flower everywhere; a species of *Lupinus*, having whitish, silk leaves and long spikes of bluish flowers, was plentiful; a Southern papaw, probably *Asimina pygmæa*, was in full flower on flat grounds, and in low, wet places plants of many kinds were blooming profusely. Several small lakes were passed; some of these seemed perfect gems, nearly surrounded by sloping grassy banks, with scattering pine trees, and in the lower places, with a thicket of oaks and other kinds of hard-wooded trees and shrubs. For a distance of 20 miles no habitations of any kind were seen; nearing Peace River the land was more undulating than any that I have heretofore seen in the State. They are also of a more fertile character; this was demonstrated by the dark green appearance of the small orange groves which now and then came into view as we preceeded westward, their density almost hiding the low homesteads around which they had been planted.

We reached Peace Creek at dusk; crossing the river on a flat-boat, we found quite a steep bank before us; on reaching the top, a few steps brought us to the town of Fort Meade. The soil, even on the higher grounds here, is dark colored and produces good crops of vegetables. Corn had reached a foot in height, but was suffering for want of rain. Orange trees showed vigorous growth. The finest looking trees which I have seen in the State were clustered round an abandoned dwelling house on the banks above Peace River. The ground was neglected and weedy; but the luxuriant growth of weeds gave positive evidence of the fertility of the soil; and the fragrance of the orange blossoms saturated the atmosphere as their dropping petals sprinkled the dilapidated building.

I had letters of introduction to Dr. Mitchell of this place. He received me cordially, and was unremitting in his attentions to make my visit agreeable, and I found that his knowledge of the country and its capabilities was as extensive as it was discriminating, and was of great service to me. As I had now reached a point unknown to railroads and steamboats, further progress became a matter of genuine anxiety. I wished to return to Jacksonville by way of Tampa and Cedar Keys, and the question to be solved was, how best to get over the sixty odd miles of territory that lay between Fort Meade and the waters of the Gulf of Mexico. Here Dr. Mitchell came to my aid. He proposed driving me to Bartow, a distance of 12 miles, where I might find the mail stage for Tampa, and in the event of that means of conveyance failing, he would take me the whole distance, so that I might reach Tampa in season to meet the boat for Cedar Keys.

On the morning of the 12th an early start was made, with a view of driving leisurely through the country. In crossing a tributary of Peace River, a rapid clear stream, I found the dogwood trees in full flower, and the air was full of the scent of the yellow jessamine, *Gelsemium sempervirens*, which was abundant everywhere.

In all sections of the State that I have seen, good, rich spots of land will be found in low, flat places, generally swampy and wet, and considered of little value; but the soil is black and productive, and I would remark that these rejected lands will at some not distant day be considered the most valuable in the State, when ditching and draining are properly recognized factors of improvement. Here, however, the higher lands were dark colored, owing to the decayed vegetable matter which they contained. In digging into this soil I found the subsoil grayish colored, evidently from the leachings of the decaying vegetable matter on the surface. Very good vegetables are produced on this land, and some corn is raised; this is a small-eared corn, and an average of 20 bushels per acre is considered a good crop. I did not ascertain whether or not any one had tried the large-grained varieties of corn from South and Central America, but one would suspect that they would do well here; at least they are worthy of trial.

Several orange groves were passed and some I visited. The lands between Fort Meade and Bartow are mostly flat pine lands, but not wet. Oranges seem to do specially well here; a short visit was made to an old grove, the property of Judge Wilson. The soil in this grove was dark-colored sand; most of the trees were 25 years old, some of them older, and some more recently planted; but young and old showed to be in the best condition of health and well covered with fruit. The larger portion of the crop had been gathered, but many trees had not been disturbed. A large tree was pointed out from which as many as ten thousand oranges had been picked in one season; the crop for this year, which had recently been taken from it, amounted to seventy-eight hundred oranges. This is the largest orange tree which I have seen, and looking at its immense sides it was evident that its capacity for bearing fruit was very great. On account of being so far from a shipping point, the returns are not nearly equal to those received by orange-growers more favorably located. I understood that the fruit from this section is transported in bulk to Tampa, where it is sold to shippers who sort and pack for market, which is not considered the most profitable system for the grower, as much of the fruit is injured in transit and by the frequent and oftentimes rough handling it is subjected to.

Sugar-cane is found to do well in these rich lands, and is very generally grown for domestic use only. The cane patch is quite as common as the cabbage patch. Tomatoes and other vegetables were well advanced, but had been checked, as I was informed, by a slight freeze the previous December.

On reaching Bartow I learned that I could avail myself of a passage in the mail stage to Tampa, and I was thus enabled to relieve Dr. Mitchell from the tedious and time-absorbing journey which he proposed to undertake in my behalf.

Before daylight on the morning of the 13th I was on my way to Tampa. The air felt cold; a dense fog prevailed, which continued until about an hour after sunrise, when it became clear and warm. The road passes through a fine country heavily timbered with pine. Many new settlements were being opened and planting commenced. Near every new homestead the young orange grove could be seen, or preparations being made for planting the trees. The older settlements are more or less surrounded by groves, and if, in peering between the stately pine trees, the eye caught a glimpse of a particularly green spot in the distance, it indicated an orange grove. The color of the foliage of the orange in these comparatively rich lands is one of the most striking features of the country.

An annoying incident which was frequently met was the smoke from forest fires. Most all parts of Southern Florida are fired during the winter months; the lands are burned over by the owners of cattle, under the supposition that it improves the grazing. This can only have a disastrous effect, as it destroys every vestige of vegetable matter on the surface, and there are no lands on this continent where vegetable matter is more needed in the soil than it is in these sandy lands. The pine trees suffer from the flames, and there must be a great destruction of wood from this cause; of course, all young growths are injured, if not destroyed. This burning ought to be prohibited by law as being in every way injurious. It has been stated that in Texas, where laws against burning are in operation, the pastures are yearly improving in value. This would seem to be a matter in which forestry conventions might do some good work by properly directed efforts.

We reached Hillsborough County about noon. Vegetation appeared to be somewhat more advanced as we neared the coast. The pond lily, *Nymphæa odorata*, was seen in fully expanded flower. Many lakes, some quite extensive, were seen in passing; they are always beautiful, but I thought that their beauty was much enhanced by the undulating character of the land surrounding them. Here, in Southern Florida, this might be termed hilly country, but it is all of a smooth, sloping character, no abrupt bluffs, but every portion available for cultivation, with no greater surface of low and wet ground than is found in similar land anywhere in this country. When these lands are brought into cultivation their fertility will be recognized.

As we proceeded westward, the country through which we passed became less picturesque. The lands were flat and wet, but the soil appeared to be good, and only required ditching to be as profitable for all farming purposes as any of the higher lands, and for culinary vegetables, sugar-cane, and grasses, would probably be preferred.

Tampa was reached after a ride of fifteen hours, and on making inquiry I learned that the boat for Cedar Keys would not sail before the morning of the 15th.

The lands immediately surrounding Tampa appear to be of a very light, sandy nature. My observations here were not extensive nor prolonged. Orange groves are to be seen in various stages of growth, and the few that I saw would not warrant an opinion as to the general condition of groves in this section. The climate is sufficiently warm to admit the successful growth of many of the hardier kinds of tropical plants. A tree like Bignonia, with clusters of yellow flowers, was blooming profusely. This I recognized as *Bignonia stans*, a tropical species. An acacia-like plant, having yellow, fragrant flowers, was probably *Vachellia Farnesiana.* Oleanders, with huge dilapidated stems, seemed, from their position, to have been planted as street trees. Guavas, and the alligator or avocada pear, *Persea gratissima*, here find a congenial climate. The gardens were gay with double scarlet geraniums, *Vinca vosea*, *Phlox drummondii*, petunias, and verbenas. A fine plant of *Russelia juncea*, planted on a slight mound, was full of flowers. In an out-of-the-way corner I observed a small area covered with the Johnson grass, *Sorghum halapense*, which had made over two feet of growth, and in good condition to cut for cattle food or for hay. This looked like an experimental plat, and it gave evidence of the value of this grass for this region of country.

One of the greatest wants in Florida is that of food for live stock. Northern grasses and clovers are of small value; they are not adapted to the climate. Lucerne, *Medicago sativa*, has the reputation of succeeding well in warm climates, and would doubtless flourish in the rich bottom lands when once they are fitted for culture. This being a perennial, noted for a propensity to send its roots deep into the soil, would be almost as permanent a plant as the dwarf palmetto, and infinitely more useful. Lucerne is one of the most ancient of cultivated plants, and as a forage plant for dry, warm climates has always been held in high estimation. Among rapid-growing grasses none excel the Italian rye grass, *Lolium italicum.* Seeds of this grass, sown in November, would produce a crop fit for cutting in April for hay. The winter season being also the dry season, would be so far unfavorable to continued growth, but the want of rain could be met by a proper selection of soil; the worst selection would be high and dry fields; the best, a thoroughly drained swamp. But I look upon the Johnson grass as having greater prospective value than either of the plants named. In Alabama and in others of the Southern States it is proving to be one of the best grasses for hay or for feeding in the green state, that has so far been introduced to cultivation. This grass has long been known, but its persistent growth, and the difficulty of eradicating it from cultivated fields, caused it to be regarded as a nuisance. Its greatest fault is its greatest merit. A few days ago, in Polk County, in conversation with an Alabama farmer, I asked him what he found the most profitable crop to raise in that State. He promptly replied hay. To the further question as to what grasses he cultivated for this purpose, he answered, the Johnson grass. He stated that he made three cuttings yearly, and from these his returns averaged five tons of hay from an acre. This is grown on good bottom land, and all the cultivation it receives is to plow it down once in two or three years, then give it a very thorough harrowing, and an increased growth ensues. A portion of the roots are thus destroyed, which prevents them from becoming too thickly matted, keeps up the fertility, and increases the growth. It would seem that a plant so well adapted to a warm, sunny climate will ultimately prove of great value all through this southern country.

At noon to-day the thermometer indicated 82° F. in the shade; towards evening a thunder storm passed over, with a light rain, the first I have seen since leaving Jacksonville.

On the morning of the 15th I went aboard the boat for Cedar Keys. The sail down the bay was exceedingly pleasant and interesting. A flock of pelicans, seemingly intent in fishing for their breakfast, was a novelty to some of us who had never before been on these waters. In due time we entered the Manatee River, making calls at several landings. Here I had pointed out to me the house of Madame Atzeroth, calling my special attention to some green bushes which I was informed were the coffee plants which produced the berries for which this estimable lady received the premium offered by the United States Government for the first pound of coffee produced in this country. I had heard this story before; indeed it had often been recited to me as an evidence of what could be produced here. Being familiar with the transaction which led to its origin, I took occasion to correct any erroneous impressions which were evidently popularly connected with it. In the first place, the Government never offered any premium for coffee. A package of fresh coffee berries was sent to the Department of Agriculture, under the impression that a premium had been offered by it for such a product, and as fresh coffee seed is rather difficult to procure, and was required by the Department, these were purchased and paid for as a matter of course. But this does not settle the question regarding profitable coffee culture on the lands bordering the Manatee River; the season of sufficient warmth is too short, and the protection which the plants require will prevent its profitable culture on an extended scale.

Leaving the river the boat was headed towards the Gulf; Egmont Key was passed, the light-house seen in the foreground backed by an orange grove; and as the sun dipped below the horizon, we were speeding quietly through the placid waters of the Gulf of Mexico. As the evening advanced a light breeze was felt from the west, which, together with the dampness of the atmosphere made it uncomfortable to be on deck, while the beauty of the clear moonlight on the water made it equally uncomfortable to be confined in the cabin. Early in the morning the vessel anchored opposite Cedar Keys. The captain informed me that the entrance to the harbor was as crooked as the letter S, and he would not attempt to reach it until daylight would enable the pilot to see the buoys. Compared with recent experiences, I considered this a very mild degree of crookedness for a Florida river.

We landed in good season to get the train for Jacksonville. The first portion of the journey leads through tracts of swampy woodlands. Near the coast an occasional cedar tree could be seen, but they have mostly been cut for use. This is the *Juniperus virginiana*, variety *bermudiana*, or pencil cedar of Florida. The wood is softer and freer from knots than the common Northern form of this tree, and the pencil manufacturers obtain their cedar wood from it; factories for working it into shape were seen as we approached the landing at Cedar Keys.

In traveling through these swampy woods I have been particularly interested in noticing a striking peculiarity of nearly all kinds of trees growing in water, or in places frequently flooded with it. The peculiarity to which I allude is a prominent bulging of growth near the ground. Many trees have a butt which would measure 2 feet through near the ground, and would dwindle into a stem from 8 to 12 inches in diameter 4 feet above this widest point. This process of growth does not seem to be confined to any single species of tree, and although it is most pronounced and conspicuous in deciduous cypress (*Taxodium distichum*), yet it could be seen in ashes, maples, slightly in oaks, and quite distinctly even on some pines, but only in trees growing in wet ground. What particular purpose is served by this abnormal growth, or what occasions it, I am unable to say.

As we proceeded onward the face of the country indicated improvement; such glimpses as could be had from the rapidly moving cars plainly showed, in the general appearance of the orange trees, the effect of two degrees of latitude, as compared with those seen in Hillsborough and adjoining counties.

I regretted my inability to see more of orange culture in the middle counties of the State. I am convinced that much might be learned from a careful observation of orange groves from north to south in their freedom from diseases; time of ripening of different varieties;

adaptability to particular locations, both in regard to soil and climate; modes of management, and many other details which might be enumerated.

A brief delay near Gainesville allowed the opportunity of seeing one of the most pleasant-looking places which I have seen in the State, with many fine improvements and comfortable-looking dwellings.

The young orange groves in this section appear healthy and of good color, but the same cannot be said of many of the older trees. Indications of unhealthiness and disease were but too apparent in the color of the foliage, and dead branches on trees which, seemingly, had not recently been trimmed. This may all be referred to unfavorable climatic influences, which are beyond the power of the cultivator to control.

After reaching Jacksonville I immediately made arrangements looking homewards. Near Charleston peach trees were observed in full flower, looking like huge bouquets, in striking contrast to those seen the previous day in Florida, where the blossoms were scattering and unpromising.

In due time Richmond came in view, and was entered in the midst of a sleety snow-storm. In twenty-four hours I had exchanged a climate of tropical heat for one of arctic proclivities.

Respectfully submitted.

WILLIAM SAUNDERS,
Superintendent of Gardens, &c.

Hon. G. B. LORING, *Commissioner.*